1. (a) Find the Taylor series for $f(x) = \sin(x)$ at $c = 0$.

   (b) Use the Taylor series for $\cos(x)$ to find the Taylor series of $\sin(x)$.
   Hint: $\frac{d}{dx}\sin(x) = \cos(x)$

   (c) Find the Taylor series of $g(x) = e^x$ at $c = 0$.

2. (a) Find the power series expansion for $\sin(x^2)$

   (b) Use this to find $\int \sin(x^2)\, dx$

   (c) Approximate $\int_0^1 \sin(x^2)\, dx$ accurate within 10^{-5}

Use series to approximate the value of the following integrals accurate within 0.001.

1. $\displaystyle\int_0^1 \cos(x^3)\ dx$

2. $\displaystyle\int_0^{1/4} \frac{1}{1+x^4}\ dx$ Hint: $\displaystyle\frac{1}{1+x^4} = \frac{1}{1-(-x^4)}$

3. $\displaystyle\int_0^1 xe^{x^3}\ dx$